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yardsticks, he is bound to catch the tortoise. The problem of infinity is therefore not involved here at all.

The résumé of this article is, that the essential meaning of ***infinity*** is endlessness, or being larger than any assignable finite magnitude, that this should therefore be the definition of the term, that whatever other properties infinite aggregates may possess should be given as additional characteristics, provided it can be proved that these aggregates really possess such characteristics, and that no aggregate is at present known which contains as many elements of the same value in its part as in the whole of it. There can, of course, be no objection to *assuming* the existence of *transfinite* numbers doing violence to our good old axiom, provided they are treated like the imaginary quantities of algebra, and provided such an assumption possess real merit in the theory of numbers. Whether or not this is the case, I leave it to greater specialists in mathematics than I am to decide.

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CURRENT PERIODICALS.

In *Scientia* for April, 1919, W. E. Harper, of the Dominion Observatory, Ottawa, sketches the part played by the spectroscope in widening our astronomical horizon. He dwells upon the method, the new determination of the motion of the solar system through space, the discovery of spectroscopic binaries and their orbits, and the problems of luminosity. "The structure of the universe is the problem toward the solution of which many lines of research are contributing," and "probably from none of them may we expect more than from the spectroscopic, because the data regarding the physical constitution and the motions of the heavenly bodies are secured at once."—Evolution and sexuality is the subject of E. Rabaud's contribution to this number. He deprecates the predominance of the attention paid to the morphological aspect of questions which are much more appropriately concerned with the physicochemical differentiations which cause the morphological change—differentiations which at times are almost ignored. After discussing the work that has been done up to the present on the genesis and nature of sexuality he proceeds to dwell upon what is known of its consequences, and how far the latest work throws light upon such vexed questions as sex-determination, and the importance in the evolution of organisms of a sexuality which may be not merely useless but even harmful to the well-being and continuance of a species.—E. Lattes takes up once again the story of the Etruscan enigma, of that obscure and much-discussed tongue which has been the subject of an age-long controversy among philologists. He is of the school which holds that there is sufficient material in hand to enable a sober judgment to be formed as to these remnants of Etruscan speech, and he holds the Italian gates against all assault.—Libby's *Introduction to the History of Science* gives to Aldo Mieli an opportunity of pointing out the pitfalls that beset the feet of those who attempt to give in a short compass an accurate and synthetic account of the development of knowledge and of man's conquest of nature.

In *Scientia* for May, 1919, Gino Loria begins the first of two articles on the past and present of mathematics in Spain.—Harold Thomson in his paper on "The Planet Mars" takes the opportunity of reminding all concerned that the astronomer has no special function to pronounce on the habitability of other worlds. He pays a well-deserved tribute to the systematic work of regular observers under the British Astronomical Association. He suggests that the destruction of great forest areas, the change in aspect of vast tracts from the green of crops to the red of ploughed-up soils, the contrast between the golden corn and the fallow fields, are among many of the causes which would account for markings hitherto attributed to the existence of artificial "channels." But it is only by the multiplication, digestion, analysis, and coordination of observations that we can hope to obtain a definite answer to the problem of the habitability of the planet.—G. Bohn's paper on a new orientation in biology renews the attack on the doctrines of "finalism" with which his name is associated. After sketching the general trend of biological speculation as dominated by the tendency to specialize—"We have anatomists, physiologists, and the like, but no biologists"—and dwelling on the reception accorded in Germany, "the land of illusions," to the theory of "substance-properties," he comes to the secular controversy on the hereditary transmission of characters, and points out that the primordial problem must be the determinism of characters. "A living being is not merely an aggregate of chemical substances, it is also a system of movements, and therefore a system of forces." This view of living beings and their external movements as the expression of the play of internal forces becomes in his hands a fruitful hypothesis, and leads to the substitution of "internal formative movements" for the "formative substances" of Sachs. He closes with the prophecy: Physics and chemistry were revolutionized in the last century by the conception of molecular motion; the present century will see a revolution in biology, and the external forms and movements of living beings will be regarded as the resultant of internal forces, the manifestations of the energy of living matter, and these will have become accessible to scientific analysis.

In *Scientia* for June, 1919, Gino Loria concludes his sketch of the past and present of mathematics in Spain, dwelling in the main upon the work of Echegaray, Torroja, and Garcia de Galdeano. and the revival which, under the notably successful leadership of J. Rey Pastor, has already achieved such promising results.—That radiation, necessarily present in material systems (in virtue of their temperature) is to be taken into account in modern chemical science, is the subject of a valuable paper by W. McC. Lewis, entitled "Radiation, the Fundamental Factor in All Chemical Change." He shows how from two different standpoints the same general conclusion has been reached by the work of Arrhenius on the one hand and Marcelin and Rice on the other—that the velocity constant must be an exponential function of the temperature. An increase in the internal energy of a molecule accounts for chemical velocity and the influence of temperature on the velocity constant. Whence is derived the additional increment of energy? The source is radiation. —Philology is represented in this number by A. Meillet's paper on grammatical style and the elimination of flection. He discusses the influence exerted upon the development of a language by the mentality of those who speak it, their degree of civilization, and by certain checks to that action arising from causes which are inherent in the system of the language in question, and which may affect it in quite unexpected directions.

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In *Science Progress* for April, 1919, we have fifty pages giving the usual summaries with ample references of "Recent Advances in Science."—"Recent Work on the Spectra of X-Rays," by W. H. Bragg, is an article of exceptional value and interest, in which the author remarks that now the war is over "we are all in the position of learners again, and it may be convenient to restate the first principles of the subject." Tribute is paid to the value of recent work in America on the improvement of the spectrometer used in analyzing the rays, and investigations on the law governing the conversion of X-ray energy into electron energy are analyzed and discussed. Such laws "are sure to throw light both on the processes of radiation and on the nature of the atoms from which radiation proceeds."—The effect of X-rays on living matter is the subject of a paper by S. Russ on "Growth and Division of Cells as Affected by Radiation." The effect of variation of the quantities of radiation is described. An "intrusion" of mathematics leads to the conclusion that if irradiation of a tumor results in diminution in cell-growth, the processes that govern the growth of the young cell to the mature form have been somehow or other subjected to change. What changes are set up in the metabolism of the cells after irradiation have yet to be discovered with certainty.—Ingvar Jörgensen and Walter Stiles deal with "The Scientific Aspects of Cold Storage," pointing out the direct bearing of the principles evolved in pure science on a subject of momentous economic importance. To this, among many other problems of the industrial order, it is now possible to assign a definite research basis.—In "The Ice-Age Question Solved," R. A. Marriott disinters the astronomical work of Drayson on the precession of the equinoxes. He aims at freeing "geologists from their astronomical trammels by convincing them that the dogma which has barred the way to an understanding of the glacial period is now practically removed." He begins by rehearsing the geological facts agreeing with Drayson, and among other claims announces that Drayson's one movement of the annual motion of the pole will account for the progressive decrease in obliquity and its rate, the time and duration of the glaciation, the changes in co-latitude of the stars, and the error in sidereal time. We may foresee in the near future a fine display of wigs on the green.—The defects from the mathematical point of view of the last edition of the *Encyclopædia Britannica* form the subject of an interesting and extremely suggestive essay by Philip E. B. Jourdain. It might be worth while, were compilers of encyclopedias likely to take any notice of it, to make a list of the biographies in which the eleventh and other editions were deficient. That such a list is necessary is obvious enough if we reflect that not till the last edition was there a life of Cauchy included, and not even then is there a life of, to mention but one name on such a list, George Green. γ